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the availability of labour, the transport required for distribution, the capital required and many other things. If one wished to make a graphical representation of the interaction of these factors, clearly it could not be done on a 2-dimensional sheet of paper, nor even in a 3-d solid. However, modern geometries have long transcended the limitations of Euclidean 3-space; and, in principle at least, the situation could be displayed in one of the n -dimensional spaces now studied. In principle, again, the same might be done with the equally or even more complex situations of human personal relationships.

So far, fair enough. We could, or rather we can imagine ourselves being able to display highly complex human psychological situations as multidimensional "hypergraphics"—if I may coin a term. But where does this get us? In recognising this possibility, do we see a way to formulating new theories, to making new and hitherto unthought-of predictions, to performing new experiments, to achieving new understanding? Of course, it is not possible to say that any particular mathematical technique will never have important applications to a particular empirical science; but on the evidence of this book, the answer to these questions is "No." The author does no more than draw some pretty pictures and dubious analogies, and provides no grounds for supposing that more can be done.

Perhaps we should not be too surprised at this, when he tells us (p. 16) that the book is "the result of many years of groping about in the dark." He seems to have groped widely, but to have made scant effort to switch on the light. He refers (p. 43) to "the early days of the Cavendish laboratory at Cambridge, when Cavendish was the Professor of experimental physics . . ." so presumably the history of science is different in spaces of higher dimension. He provides rather a good analysis of a chess game and a straightforward one of *A Midsummer Night's Dream*, decking both out in mathematical language which seems uncalled for. There is an illustration of a lady running water into a bath with the plug out: your reviewer's natural suspicion is that it was posed and taken by a male chauvinist who wished to insinuate how impractical women are.

N -dimensional geometry seems a poor shield against fashionable nonsense (on p. 61 there is reference to "contradictions" within social systems) or against simple mis-statement (on p. 68 the author seems to think that osmosis is something we absorb.) However, it evidently provides a splendid method for re-stating the obvious in terms which appear both original and profound. How wise is the man who can write of the "personal intimacy . . . between the man and woman when each is the N -self", and who can perceive that ". . . to effectively warp the geometry of society . . . is usually known as revolution" (p. 159). Which is to effectively split an infinitive as well as to suggest how much more profound is the writer's geometrical insight than that of poor want-wits who know not Riemann.

However, the author is at pains to demonstrate that geometrical expertise is wholly compatible with tender sympathy and insight. "When you reach middle age," he assures us (p. 189) ". . . you are amenable to awakening again to the geometry which came more easily and instinctively in the sweeter years of youth. So a middle aged man will fall in love with a younger woman—because his younger geometry is searching for the younger geometry of his (Jungian) animal self? That geometry is still there and still very real; it is no mean (sic) fantasy. . . ."

No doubt your reviewer is only one of those whom the author roundly (or hyperspherically) condemns as "lackeys of the social orthodoxy" (p. 188) but he can discern no merit in this. In fact he can detect little merit anywhere in the book. Perhaps the trendy Sunday supplements will love it; but those who wish seriously to study and – however incompletely – to understand the daunting complexities of human behaviour will scarcely seek for anything in it. Which is as well, for there is no index.

M. HAMMERTON

FRITH, U. (Ed.). *Cognitive Processes in Spelling*. London: Academic Press. 1980. Pp. 560. £17.00. ISBN 0 12 268660 8.

Foreigners always spell better than they pronounce, wrote Mark Twain; but most of us (not being foreigners) pronounce a lot better than we spell, and read better than we spell, too.

Why this should be so can be learned from this volume: spelling is more difficult than most other types of language performance. Nelson (Chapter 21), for instance, points out that spelling is harder than reading in three ways: when we are reading we know that each string we encounter is (or is intended to be) an existing word; we can often recognise written words on the basis of a few letters only; and the number of possible phonetic realisations of a particular letter is (in English at least) less than the number of graphemic realisations of a given sound. As Henderson and Chard (Chapter 5) point out, this latter fact also explains why there is generally little correlation between how easily a word is spelt in relation to other words, and how easily it is read.

Given that spelling is so hard in comparison with reading, it is perhaps surprising that it has attracted rather less research than reading and word recognition. This book, with its extensive bibliography, demonstrates that research on spelling is well under way, but there is still a much greater literature on reading and word recognition. Frith's book, therefore, is a timely publication. It is handsomely produced, with very few typographical errors (which even then seem to make a point, since they are almost entirely of the kind well known to be not easily detectable -*frequent*, *precent*, *visualaiser*); moreover it seems to have been transformed from manuscript to finished product in a comparatively short time. On all of these points the editor is to be congratulated.

The book contains 22 chapters, most of which report experimental investigations of spelling by various populations: good readers; poor readers; dyslexics; deaf children; speakers of black English; aphasic children; normal adults. The writers are British and American researchers whose work is already well known in the field. (In choosing contributors, the editor has laid a trap for the reviewer, whose spelling competence is tested by the necessity to avoid confusing Barron with Baron, or spelling Baddeley badly.)

There is a fascination to be found in the unusual or anomalous performance of some of the groups described. Frith (Chapter 22) discusses those efficient readers/writers, highly verbal people in general, who cannot spell for peanuts. What are they doing wrong? Bryant and Bradley (Chapter 16) investigate why children can sometimes write words correctly when they cannot read them. Marcel (Chapter 17) finds a group of dyslexics who have a specific problem with certain initial and terminal consonant clusters. Cromer (Chapter 18) discusses the comparatively good spelling performance of children who are deaf and children who have no oral language whatsoever. These latter children, it is argued, are relying on a purely visual code, although both Cromer and Dodd (Chapter 19) find evidence that deaf children have a phonological code at their disposal. The problem with Marcel's subjects appears to be that their internal representations of consonant clusters are not phonemically segmented. Frith's poor spellers who are good readers are relying too heavily on an efficient partial-cue word recognition strategy in reading, and have not adequately developed the full-cue technique which is necessary if orthographic detail is to be committed to memory. Similarly, Bryant and Bradley's child subjects are using a phonological strategy in spelling but not in reading.

What, then, makes a good speller? The answer given by this book is: flexibility. The best readers and the best spellers have available to them a variety of alternative strategies between which they can choose according to the nature of the task. Over-reliance on any one strategy in any aspect of language use can lead to a loss of efficiency. Thus, as Frith's chapter shows, it is necessary to make use of differing strategies in *reading* in order to become a good speller. Cohen's discussion (Chapter 7) of reading also reaches the conclusion that the reading process must be flexible, with alternative strategies being selected according to the orthographic and other characteristics of the material being read. Similarly, Barron (Chapter 9) reports that good readers tend to use both visual-orthographic strategies and phonological strategies in both reading and spelling, while poor readers use only one strategy per task—visual-orthographic for reading, phonological for spelling.

However, it is clear that every good speller must to a certain extent spell by rote. As Seymour and Porpodas (Chapter 20) clearly explain, a word's spelling has two functions: to define the lexical identity of the word, and to indicate its pronunciation. In a language like English, the latter function is very imperfectly fulfilled, so that the generation of spelling from

pronunciation is not a reliable strategy. [Attempts at spelling reform, as Venezky (Chapter 1) shows, have always failed and probably always will.] Sloboda (Chapter 11) shows that good spellers spell by rote irrespective of whether or not they have, otherwise, a good visual memory. When one is uncertain of the spelling of a word, of course, it helps to write down the alternatives and look at them. Henderson and Chard (Chapter 5) claim that this well-known phenomenon has never actually been experimentally demonstrated, but in point of fact it has, by Tenney (Chapter 10).

The good speller, then, is able to draw on both phonological and visual-orthographic (rote) strategies. Linguistic knowledge is also useful—Smith (Chapter 2) shows that syntactic and etymological information is brought into play in making orthographic decisions. It would also help to speak a dialect which gives consistent phonetic realisation to graphemes, and realises as much graphemic information as possible (Desberg, Elliott and Marsh, Chapter 4).

However, we are not all good spellers. There are enormous differences in the way individuals perform various language tasks, let alone in their efficiency. Baron *et al.* (Chapter 8) continue Baron's earlier work on the "Phoenician-Chinese" continuum (the degree to which individuals make use of spelling/sound rules). Their concluding suggestion is that Phoenicians (those who make most use of the rules) are better at segmental analysis (although it is not quite clear whether this is cause or effect). The only really sure way to be a good speller is to be good at absolutely all varieties of language performance.

Even the best spellers, though, sometimes make unintentional spelling errors: slips of the pen. There are two chapters here on writing errors: Hotopf (Chapter 13), on the similarities and differences between slips of the tongue and slips of the pen, and Wing and Baddeley (Chapter 12), who analyse with exemplary care a large corpus of such errors culled from examination scripts. From these two papers it is possible to predict where slips of the pen are most likely to occur: towards the end of a sentence, around the middle of a word, and on a letter without ascenders or descenders (whoops!).

This collection of papers, then, is an admirable production. There is, inevitably, some variation in quality between the chapters, some turgid writing here and there, some experiments which are open to methodological criticism, and others reported in insufficient detail. But the effect of the whole is to give a remarkably coherent picture of a solid body of research results.

ANNE CUTLER

HERRON, J. (Ed.). *Neuropsychology of Left-Handedness. Perspectives in Neurolinguistics and Psycholinguistics*. London: Academic Press. 1980. Pp. xiv+357. £13.50. ISBN 0 12 343150 6.

Much attention was directed to handedness in the 1920s and 1930s but the topic went out of fashion for several decades after the War and has only recently regained its erstwhile popularity. This is no doubt due to the steadily accumulating evidence that functional asymmetries between the cerebral hemispheres exist which go considerably beyond the lateralisation of speech. No doubt Roger Sperry's brilliant work on split-brain man added further fuel to this revival of interest in handedness and cerebral asymmetry.

This book contains 16 chapters, mostly by different authors, varying considerably in length, style and coverage. It is introduced by Lauren J. Harris, who contributes a long and highly readable account of early theories, facts and fancies concerning left-handedness. This provides a wealth of interesting information, some of it pleasantly esoteric, which at all events testifies to the fascination which left-handedness has exercised down the ages. It contains some useful scientific information too.

The remaining chapters are divided into three broad groups. The first (five papers) is concerned with neuroanatomical, embryological and genetical issues relating to handedness and lateral asymmetry and its authors include Sandra Witelson (neuroanatomical asymmetries), Charles Boklage (embryological issues relating to functional asymmetry) and Sally